GLOBAL CLIMATE HIGHLIGHTS

MAJOR CLIMATIC EVENTS AND ANOMALIES AS OF JUNE 12, 1993

1. Southern Alaska and Western Canada:

UNUSUALLY MILD WEATHER ENDS.

Temperatures returned to near normal last week [Ended at 9 weeks].

2. Western United States:

LATE–SEASON WETNESS DEVELOPS.

Up to 80 mm of rain fell on a few locations as unseasonably heavy precipitation was observed for the fourth consecutive week [4 weeks].

3. Southeastern United States:

DRYNESS PERSISTS.

Up to 80 mm of rain fell on parts of the Carolinas, but most areas received less than 10 mm. Six–week moisture deficits ranged from 100 to 200 mm across most of the region [7 weeks].

4. Europe:

WARM AND DRY CONDITIONS SHIFT SOUTHWARD.

Temperatures averaged 3°C to 7°C above normal across much of western and southern Europe [9 weeks]. Up to 150 mm of rain inundated a few locations in central Europe, but most of Germany and Italy received less than 20 mm. Six–week precipitation shortfalls reached 200 mm in former Yugoslavia [9 weeks].

5. Western Sahel:

RAINS BRING RELIEF, BUT POCKETS OF DRYNESS REMAIN.

Moderate rains (30 to 80 mm) fell on the southern and eastern portions of the Sahel, reducing moisture deficits. [Ended at 6 weeks].

6. Southwestern Asia:

AREA STILL WET.

Although most of the region received less than 20 mm of precipitation, moderate showers dropped 30 to 60 mm of rain on a few locations. Six–week moisture surpluses remained near 140 mm in parts of Iran [Ending at 6 weeks].

7. South–Central Asia:

WET WEATHER EASES, BUT MONSOONAL FLOODING AND HEAT WAVES AFFLICT AREAS FARTHER SOUTH.

Although up to 50 mm of rain dampened south–central Siberia, little or no rain fell on northern India. Farther south and east, however, monsoonal flooding left over 1.5 million homeless in Bangladesh, half a million homeless in extreme eastern India, and nearly 300,000 homeless in Sri Lanka as daily rainfall totals approached 190 mm, according to press reports [Ending at 11 weeks]. Temperatures soared to 50°C in parts of Pakistan as a heat wave claimed over 100 lives, according to press reports. Some locations reported daily lows dropping only to 32°C [Episodic Event].

8. Korea and Northeastern China:

HIGHLY VARIABLE PRECIPITATION REPORTED.

Up to 150 mm of rain drenched North Korea and 20 to 70 mm dampened east–central China and eastern Manchuria as the wet spell continued [WET–9 weeks]. In sharp contrast, precipitation totaled only 10 to 40 mm farther north and west as moisture shortages began to grow in western Manchuria and Inner Mongolia [DRY–4 weeks].

9. Taiwan and Southeastern China:

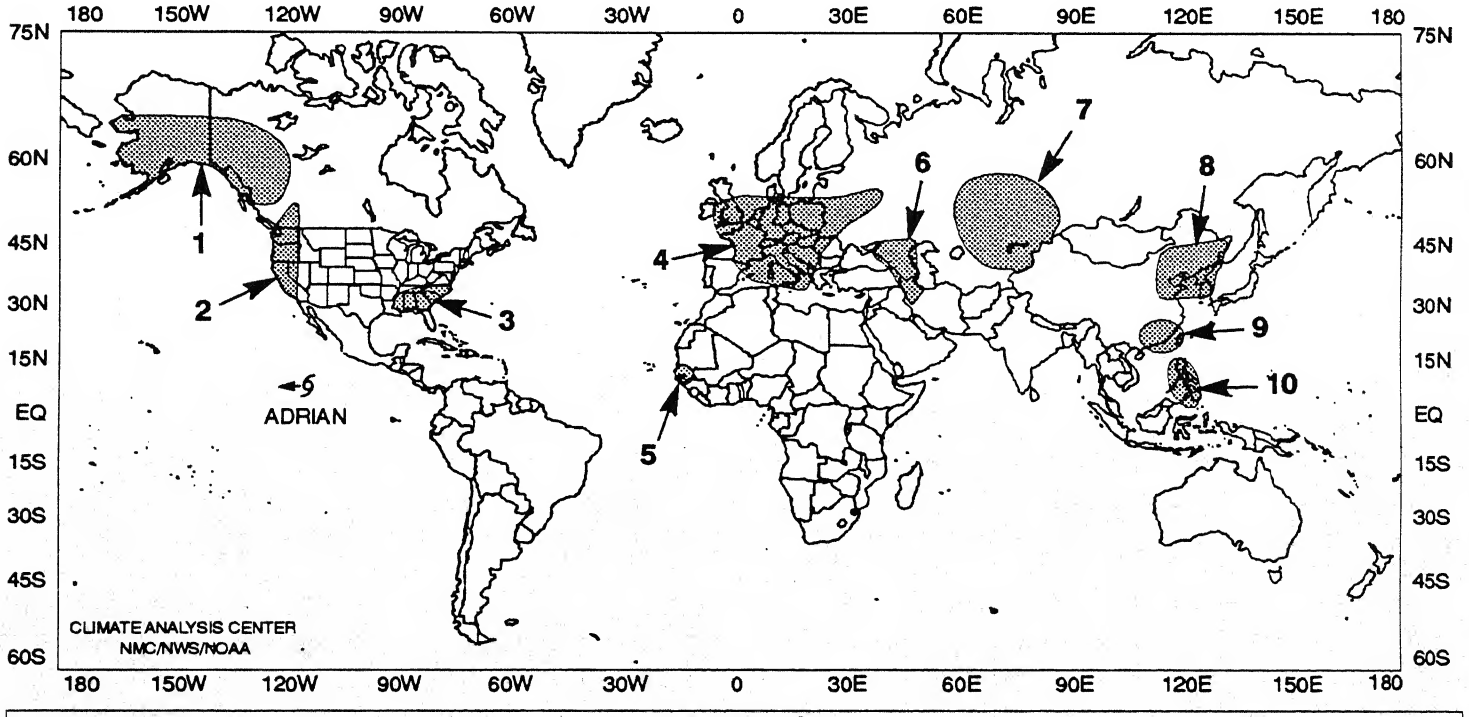
HEAVY RAINS INUNDATE REGION.

Heavy downpours dumped up to 300 mm of rain on the region as six–week moisture surpluses climbed to 300 mm in China and to 450 mm in parts of Taiwan [9 weeks].

10. Philippines:

LARGE PRECIPITATION DEFICITS REMAIN.

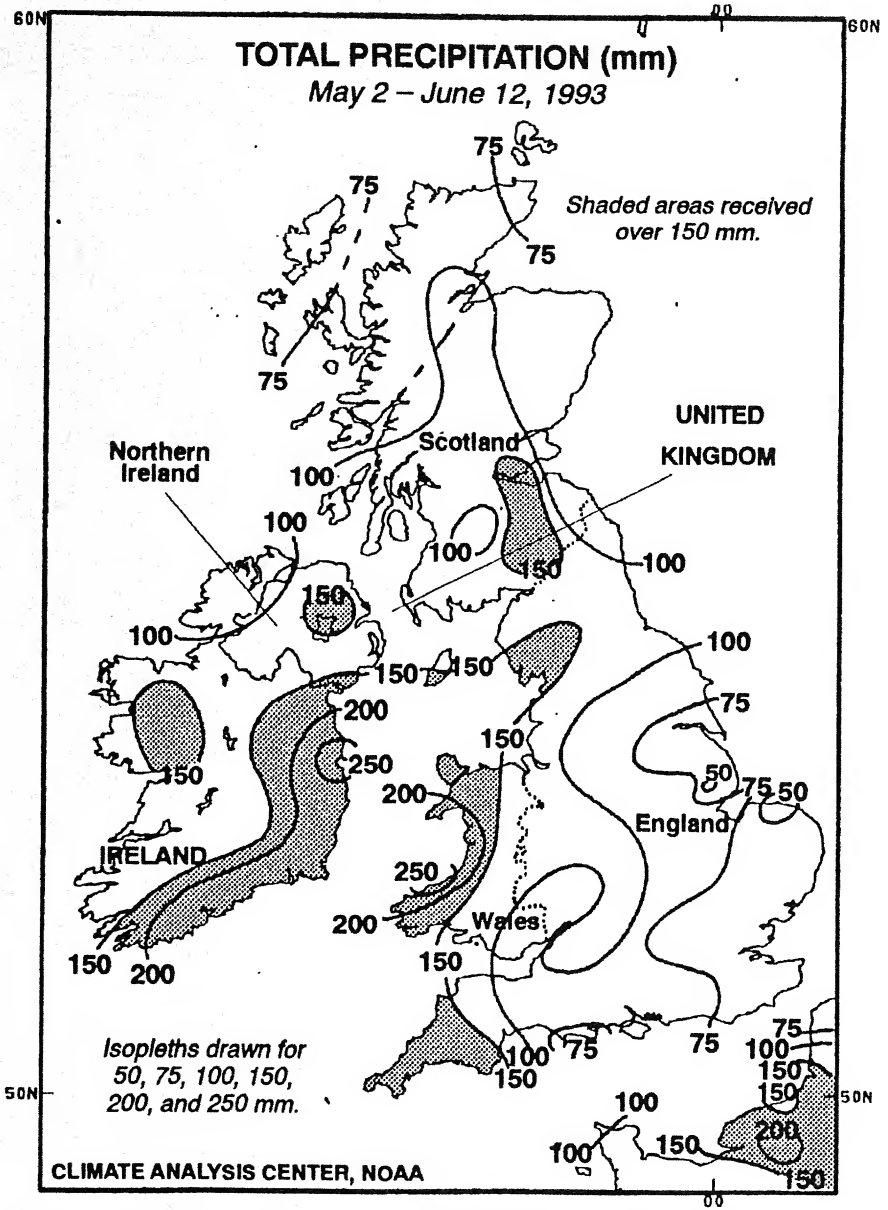
Rainfall totals of 40 to 90 mm brought some relief to scattered locations, but most of the region received less than 30 mm. Six–week moisture shortages of 100 to 300 mm remained widespread across the archipelago [7 weeks].

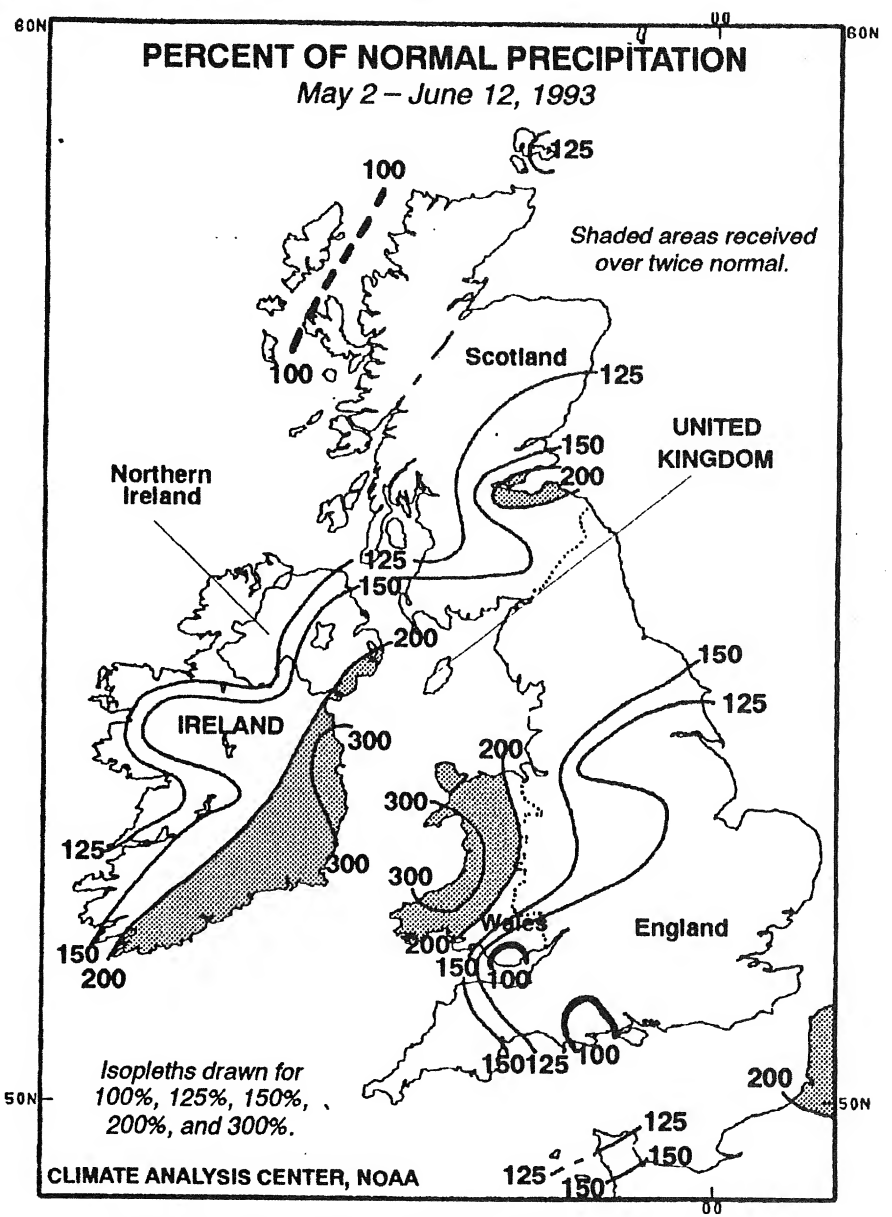


EXPLANATION

TEXT: Approximate duration of anomalies is in brackets. Precipitation amounts and temperature departures are this week's values.

MAP: Approximate locations of major anomalies and episodic events are shown. See other maps in this Bulletin for current two week temperature anomalies, four week precipitation anomalies, long–term anomalies, and other details.





STORMY WEATHER LASHES THE BRITISH ISLES. *During the last six weeks, very wet conditions dominated the British Isles, with over 250 mm of precipitation falling on portions of western Wales and eastern Ireland. Over 150% of normal totals was measured from southern Ireland and England northeastward across central and eastern Ireland, Northern Ireland, Wales, western and northern England, and southern Scotland. According to press reports, torrential downpours lashed the Isles during the last few days of the period, taking four lives across the region and causing approximately 30 million dollars (American) of damage in Ireland alone. Hundreds of homes in north Wales were flooded, and street flooding in Dublin, Ireland was reportedly the worst since Hurricane Charlie pounded the city in 1986. Train service was disrupted, numerous power lines were downed, and all roads leading to Dublin Airport were cut off Friday night and Saturday.*

UNITED STATES WEEKLY CLIMATE HIGHLIGHTS

FOR THE WEEK OF JUNE 6 – 12, 1993

Slow–moving storm systems generated severe weather that raked much of the Great Plains, Mississippi and Ohio Valleys, and Great Lakes. Early in the week, an onslaught of tornadoes and high wind gusts blew roofs off homes, overturned cars, and downed trees in south–central Nebraska. At least two homes were destroyed and more than a dozen cattle were killed, according to press reports. Thunderstorms also produced heavy rain over north–central Missouri with more than six inches near Boonville. On Monday, tornadoes caused more damage in South Dakota while the Chicago, IL area was deluged with up to four and a half inches of rain in two and a half hours, resulting in highway and public transportation problems. Hundreds of passengers were forced to spend the night at Chicago's O'Hare Airport because their flights were canceled. Officials said the rain was the heaviest in more than 30 years, and Illinois Governor Jim Edgar declared disaster areas in Cook and DuPage counties. In central and southern Wisconsin, twisters tore down trees and utility polls and destroyed hundreds of buildings. On Wednesday, storms left thousands of utility customers without power in New Jersey, West Virginia, Connecticut, and Indiana. In Oklahoma, three consecutive days of violent weather resulted in numerous downed trees, torn roofs, damage to mobile homes, and rivers rising out of their banks. Thunderstorm winds of 60 mph to 100 mph knocked down trees in New York, Pennsylvania, Kentucky, Texas, and southern Illinois. Elsewhere, the southern Atlantic Coast States sweltered in hot, humid air; around a half dozen high temperature records were established each day from Monday to Friday. In sharp contrast, unseasonably cold weather settled over the Intermountain West as a late season winter storm blanketed the higher elevations of the northern Cascades and northern and central Rockies with moderate to heavy snow.

The week commenced with intense thunderstorms barraging the lower and middle Missouri Valley with hail, high wind gusts, and heavy rains. Showers and thunderstorms were also widespread over the Far West, Intermountain West, northern Rockies, northern Plains, upper Mississippi Valley, Great Lakes, and Northeast. In Florida, thunderstorms spawned large hail and tornadoes near Fort Myers. On Monday and Tuesday, showers and thunderstorms continued to blossom in the warm, humid air ahead of a slow–moving frontal system that formed over the Great Plains. Heavy rains soaked much of the region from Oklahoma to the Great Lakes and portions of the northern Plains, upper Mississippi Valley, and mid–Atlantic. Tornadoes touched down in South Dakota, Oklahoma, Texas, Iowa, Minnesota, Illinois, Indiana, and Ohio. Elsewhere, snow covered the higher elevations of the northern and central Rockies while temperatures climbed into the upper nineties in the Southeast. Jacksonville, FL, set a daily high temperature record of 100°F.

At mid–week, showers and thunderstorms continued to develop ahead of the frontal system which began to move more quickly eastward. Severe weather and heavy rain extended from Texas to the Northeast, with tornadoes reported in Oklahoma, Kentucky, West Virginia, and Pennsylvania. During the latter part of the week, heavy rain continued along and south of the front which became stationary at week's end, reaching from northern Missouri to the North Carolina coast. Torrential downpours of up to two and a half inches in thirty minutes deluged portions of north–central Kentucky. Farther west, a Pacific Ocean storm spread more heavy precipitation across the Northwest, northern Intermountain West, and northern Rockies. On Saturday, the system moved into the northern and central Plains, generating more locally heavy rain. The Southeast continued to bake as temperatures topped the century mark at a few locations.

According to the River Forecast Centers, the greatest weekly precipitation totals (between two and nine inches) fell over much of the southern Plains, the middle Mississippi and Ohio Valleys, the southern Great Lakes, and the northern High Plains. Amounts of more than two inches were also scattered across the Southeast, the mid–Atlantic, the Northeast, the east–central Plains, the northern and central Rockies, the northern Intermountain Plateau, the Sierra Nevadas, western Washington, south–central Alaska, and the remainders of the northern Plains and Mississippi Valley. Light to moderate amounts were measured in the eastern Great Basin, eastern Hawaii, and the remainders of the Northwest, northern California, the northern and central Rockies, southern Alaska, and the eastern half of the nation. Little or no precipitation fell on southern California, the Southwest, the western Great Basin, the southern Rockies, the central High Plains, northern and central Alaska, and western and central Hawaii.

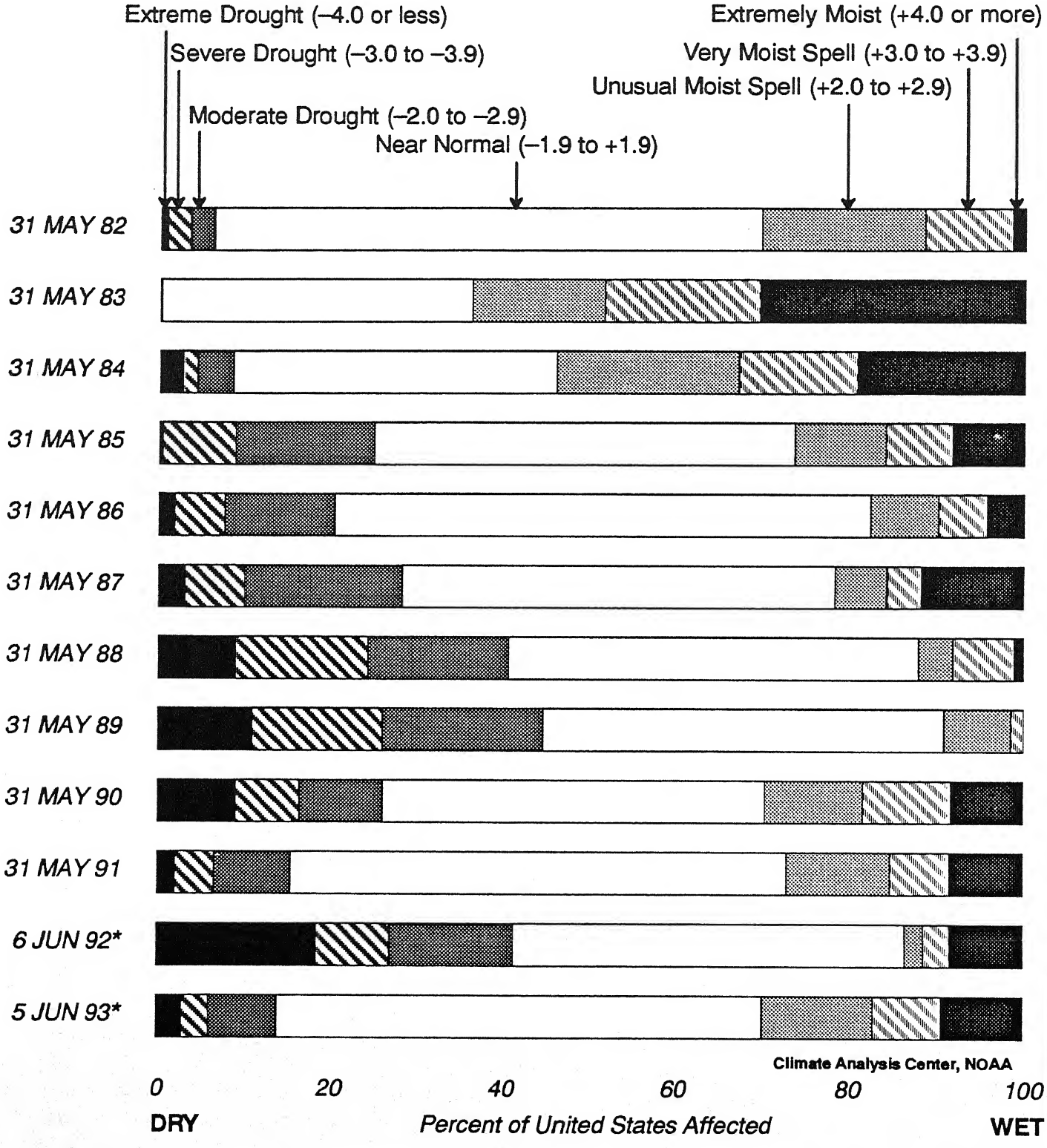
Warmer than normal conditions covered much of the eastern half of the country and portions of the immediate Pacific coast, with departures of +4°F to +8°F prevalent in the Southeast. The heat and humidity combined to produce apparent temperatures of 100°F to 109°F along the Atlantic seaboard from northern Florida to Delaware. In Alaska, temperatures averaged slightly above normal over much of the state, with weekly departures reaching +4°F in the southeastern sections. Temperatures also averaged above normal in Hawaii.

In the western half of the United States and the Northeast, abnormally cool weather prevailed, with temperatures averaging 5°F to 9°F below normal across much of Intermountain West. Temperatures dipped to below freezing in portions of the Great Basin and central Rockies. In Alaska, below normal temperatures were limited to scattered locations in the central portion of the state.

NORTH AMERICAN CLIMATE HIGHLIGHTS FEATURE

PERCENT OF UNITED STATES AFFECTED BY A WET SPELL OR DROUGHT, BASED ON THE PALMER INDEX

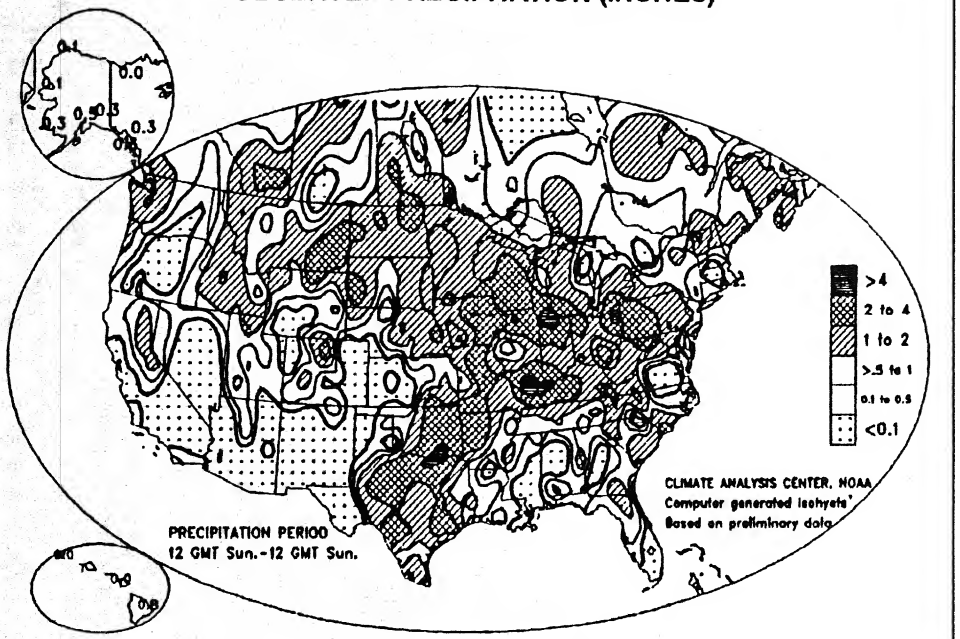
At the end of May, 1982 – 1993



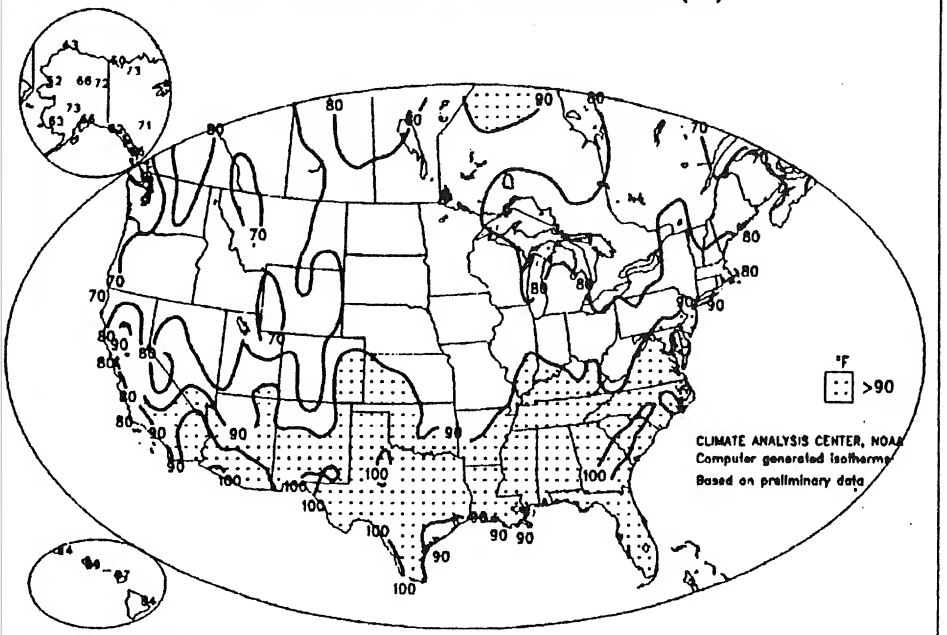
Percent of Area Affected by Wet Spells and Drought, as computed by the Climate Analysis Center. *Based on the Palmer Drought Severity Index at –4, –3, –2, +2, +3, and +4, computed by climate divisions. Dry conditions are on the left and wet conditions are on the right. Preliminary values (*) are used for 1992 and 1993.*

UNITED STATES WEEKLY CLIMATE CONDITIONS *(June 6 – 12, 1993)*

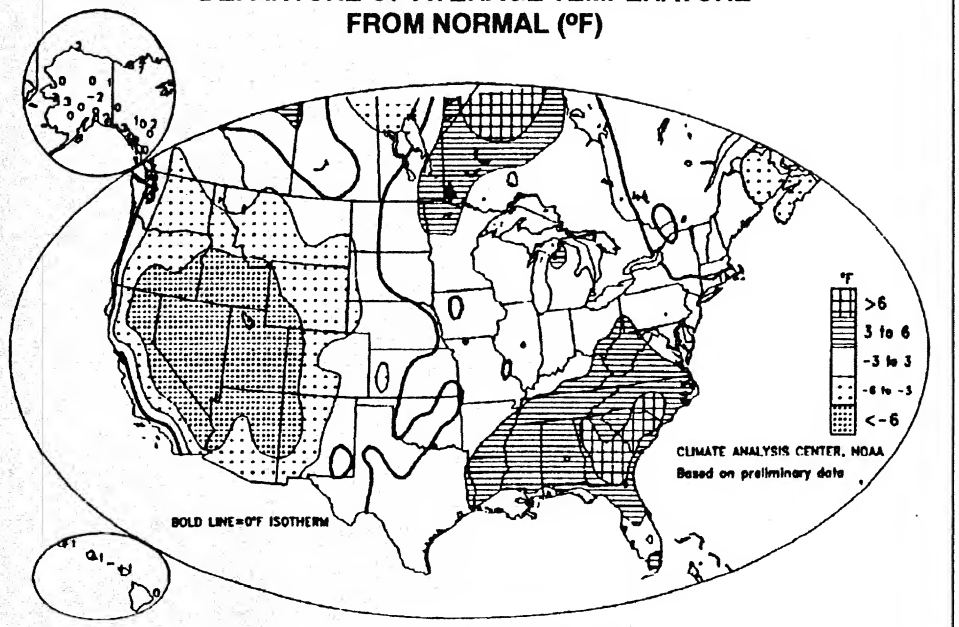
OBSERVED PRECIPITATION (INCHES)



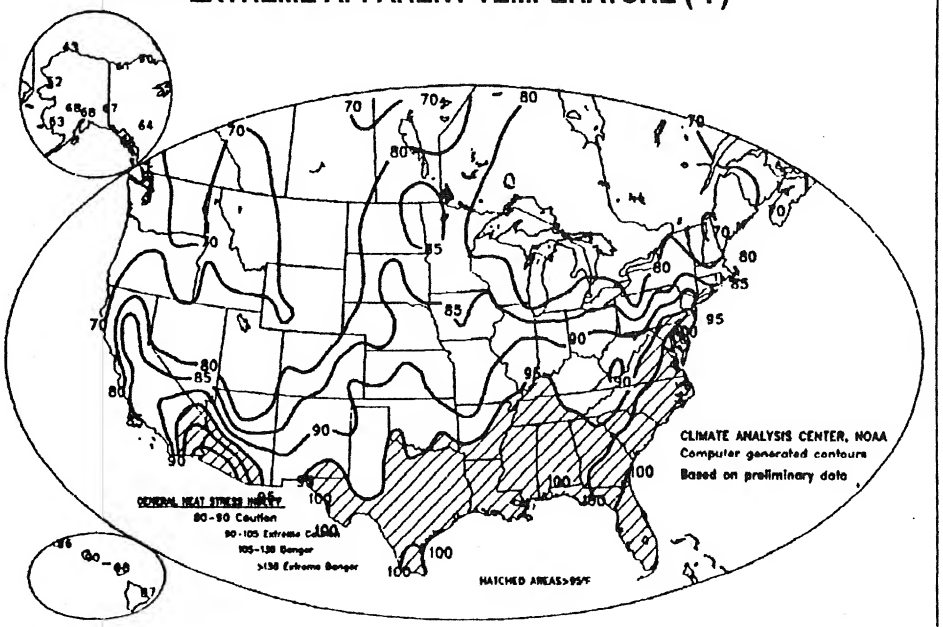
EXTREME MAXIMUM TEMPERATURE (°F)



DEPARTURE OF AVERAGE TEMPERATURE FROM NORMAL (°F)

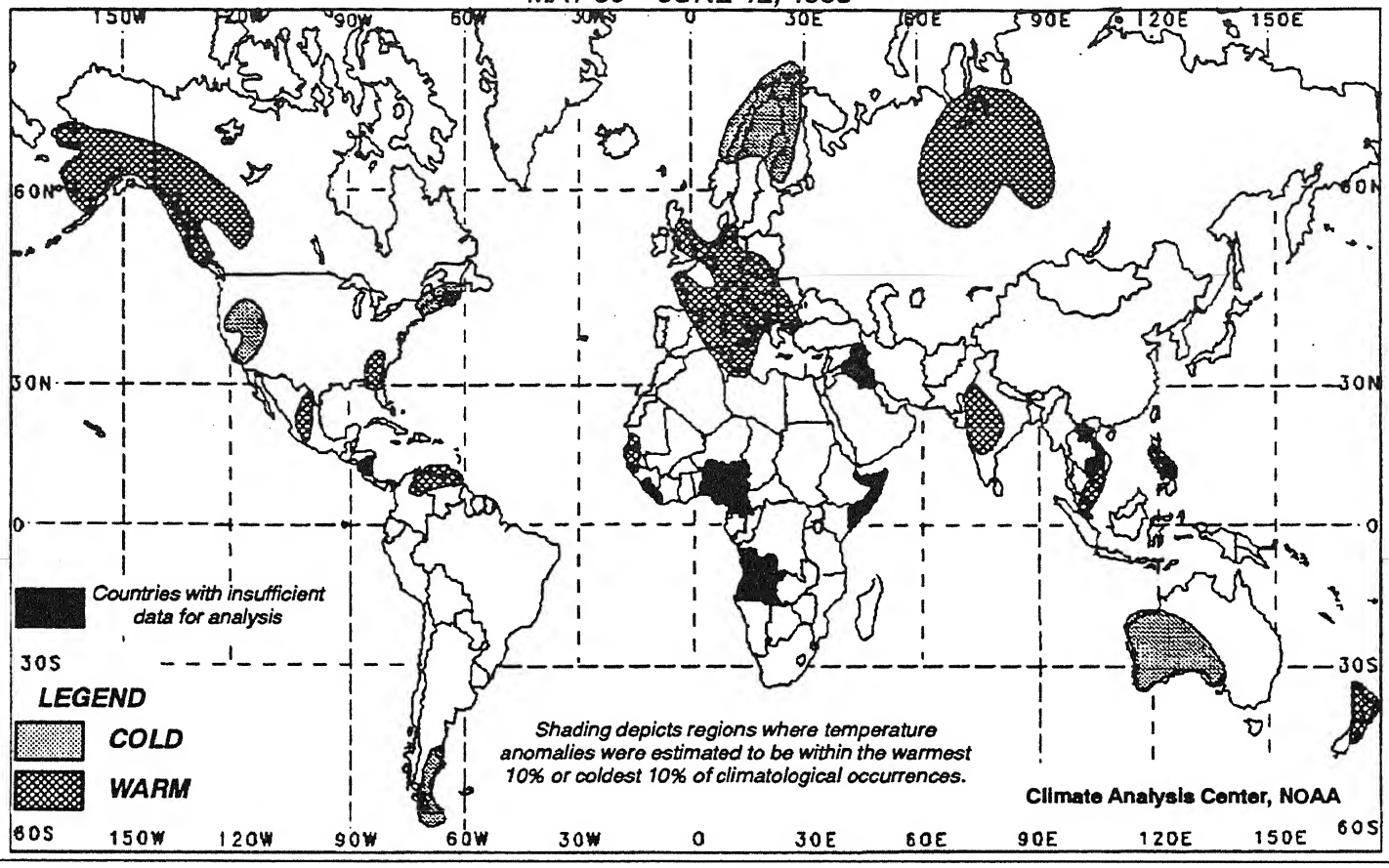


EXTREME APPARENT TEMPERATURE (°F)



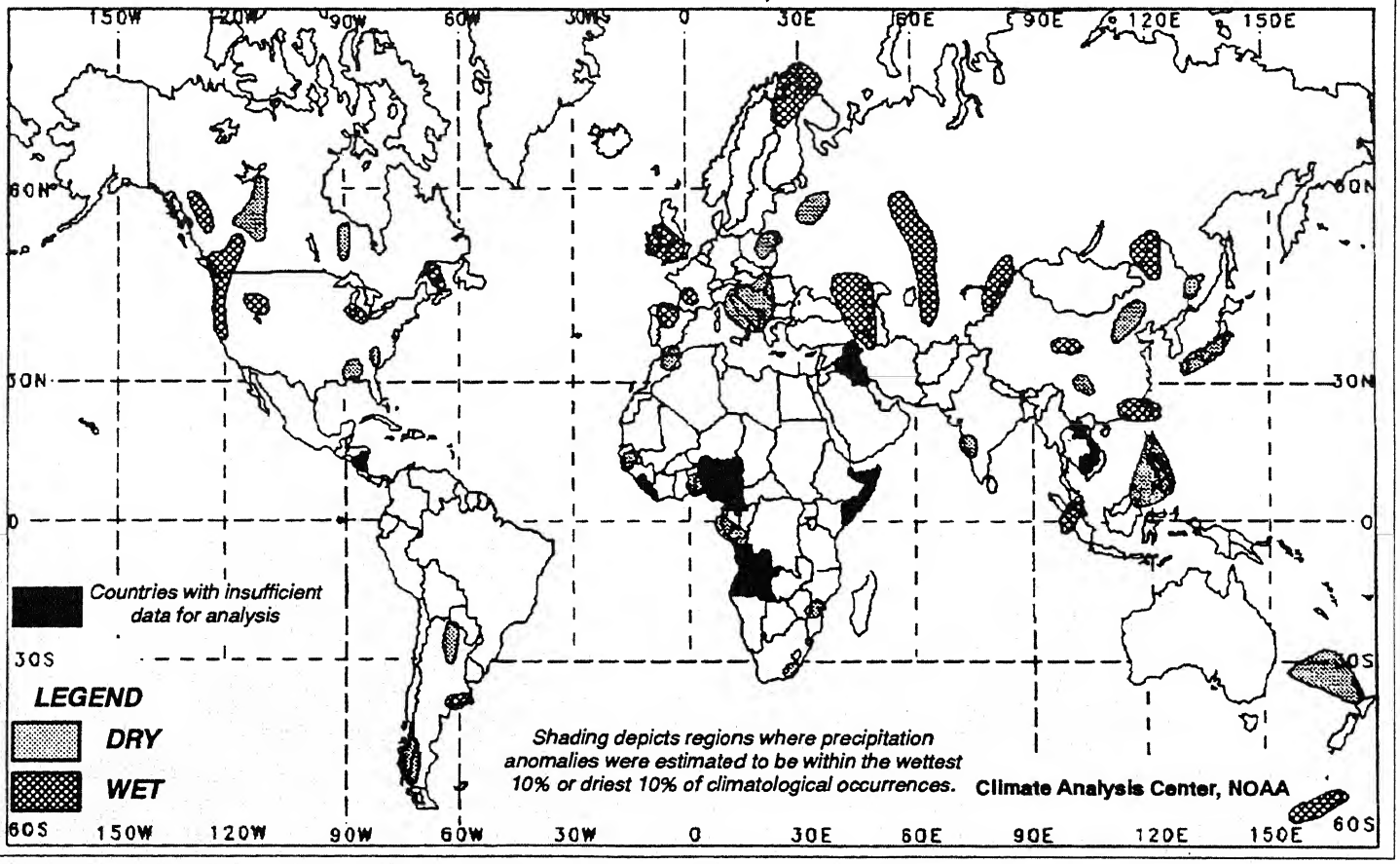
TWO–WEEK GLOBAL TEMPERATURE ANOMALIES

MAY 30 – JUNE 12, 1993



FOUR–WEEK GLOBAL PRECIPITATION ANOMALIES

MAY16 – JUNE 12, 1993



UNITED STATES SEASONAL CLIMATE SUMMARY

SPRING (MARCH–MAY) 1993

March opened with stormy weather across much of the nation. Up to three feet of snow buried Cuchara, CO while four to six inches of rain soaked parts of southern Texas, southern Louisiana, and southern Mississippi. Flooding continued along the Gila River in Arizona while a powerful storm with hurricane–force wind gusts downed numerous trees and power lines and dropped heavy precipitation across the central Appalachians, mid–Atlantic, and southern New England. The second week of March featured a massive winter storm that generated heavy rains from northern Louisiana to southern Georgia and very heavy snow from northern Georgia northward through much of the eastern third of the country, including the East Coast Megalopolis from Washington, DC to Boston, MA. Widespread blizzard conditions covered the Appalachians, northern mid–Atlantic, Northeast, and New England, where between one and four feet of snow fell. The "Blizzard of '93" claimed 200 lives, with property damage and storm clean–up costs totaling near one billion dollars, according to press reports. Bitterly cold Arctic air settled over the eastern half of the nation in the wake of the "Storm of the Century", and the third week of March opened with around seventy daily and several monthly low temperature records established from the Great Plains eastward to the Atlantic Coast. Subfreezing readings plunged to the central Gulf Coast while subzero temperatures reached the northern Plains, Great Lakes, and mid–Atlantic. The end of March brought more wintry weather to the north–central and northeastern states as up to a foot of snow blanketed portions of the middle Missouri Valley, the Great Lakes, and New England.

A combination of heavy rain and melting snow at the beginning of April caused widespread flooding across the upper and middle Mississippi Valleys, the mid–Atlantic, and the Northeast. Violent thunderstorms spawned tornadoes, gusty winds, and large hail across much of the South and Southeast. Farther northwest, a late–season winter storm dumped up to seven inches of snow on the High Plains from southeastern Wyoming to central South Dakota. The middle of April was punctuated by more thunderstorms as locally heavy rain, large hail, and powerful wind gusts buffeted Kansas, Nebraska, Iowa, Missouri, Arkansas, eastern Oklahoma, and northeastern Texas. A tornado tore through suburban Tulsa, OK, claiming several lives and destroying numerous buildings. Torrential rains produced flash flooding from northern Iowa to southern Michigan and exacerbated river flooding in western New York. April closed with another round of thunderstorms pounding the southern and central Plains and the lower Mississippi and Tennessee Valleys. In the Northeast, heavy rain and snowmelt combined to generate severe flooding along the shores of Lake Champlain, which rose to its highest level on record.

Severe flooding occurred along the Hondo and Guadeloupe Rivers in southern Texas, the Des Moines and Raccoon Rivers in central Iowa, the Big Sioux River in southeastern South Dakota, and the Rock River in southwestern Minnesota as May began. In addition, heavy rains engendered flash flooding in the southern and central Plains, and a 160–mile stretch of the Missouri River from Kansas City to east of Boonville, MO was closed to navigation for fear of boat wake damage to weakened levees. Wet fields in Iowa generated concern that crops would not be planted in time to take advantage of the full growing season. Numerous tornadoes lashed the nation's midsection during the first half of the month as thunderstorms frequented the northern and central Rockies, Southeast, Appalachians, and mid–Atlantic. In the middle of May, a cool high–pressure system slowly settled across the eastern two–thirds of the country. Lows in the thirties penetrated as far south as eastern Tennessee and western North Carolina and late–season snows blanketed the Carolina mountains. Frost whitened the valleys of western Pennsylvania, western Virginia, and West Virginia. Farther west, locally heavy rains combined with a rapidly melting snowpack in the Rockies to engender flash floods, rock and mud slides, and serious river flooding across the central and northern Intermountain West and Rockies. Although May came to a relatively tranquil close, an early–season tropical depression soaked much of southern Florida with up to ten inches of rain, while torrential downpours drenched southeastern Kansas.

According to the River Forecast Centers, the greatest seasonal precipitation totals (more than 12 inches) were measured across the Pacific Northwest, the central Rockies, the Ohio and lower Mississippi Valleys, and the Appalachians. More than two feet drenched coastal Oregon, and more than twice the seasonal normal fell on interior sections of northern California and Oregon (page 8). Five of the nine regions as defined by the National Climatic Data Center (NCDC) received above median spring precipitation, with Spring 1993 ranking 6th and 10th wettest in the Northwest and East–North Central regions, respectively (page 9). This was the fourth spring in the last ten years to rank among the wettest ten such seasons on record in the Northwest Region (page 12). On a statewide basis, Idaho experienced the 3rd wettest and Oregon the 4th wettest such season in 99 years of record. Nationally, Spring 1993 ranked as the 32nd wettest of the 99 such seasons on record at NCDC.

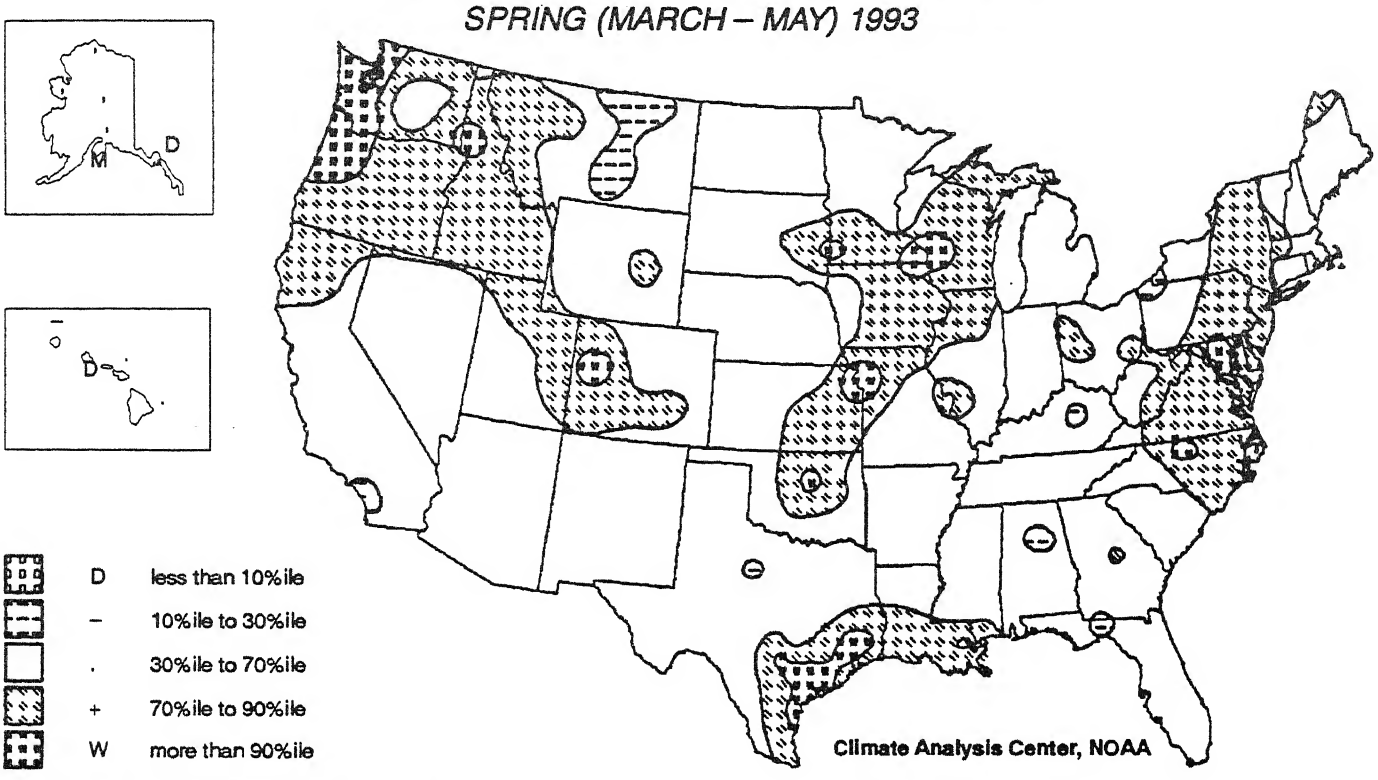
Subnormal precipitation was restricted to the desert Southwest, the northern High Plains, and parts of the Ohio, Tennessee, and central Mississippi Valleys (page 8). Four of the NCDC regions observed below–median precipitation totals, with the Southwest experiencing the 32nd driest spring in the last 99 years (page 9). On a statewide basis, only Montana and Nevada experienced one of the twenty driest springs since 1895. Both Alaska and Hawaii also reported subnormal seasonal precipitation totals, with many locations receiving less than 60% of normal amounts. Hilo, Hawaii reported a rainfall deficit of more than ten inches for Spring 1993.

Unusually cold conditions prevailed across most of the eastern half of the country with departures of –2°F to –5°F widespread across the Plains and the Southeast (page 10). Submedian seasonal temperatures were recorded in the five easternmost NCDC regions, with the Southeast and the South both experiencing the 10th coldest spring in 99 years of record (page 11). This was the coldest spring observed in the South Region since 1983 (page 12). South Carolina, Arkansas, and Louisiana ranked 4th, 5th, and 6th coldest on a statewide basis, respectively, while four other states (AL, FL, GA, and MS) reported seasonal mean temperatures among the ten lowest since 1895. Nationwide, Spring 1993 was the 41st coldest such season since records began in 1895, and the coldest spring nationally since 1984.

In sharp contrast, temperatures averaged 2°F to 5°F above normal across most of the western half of the country (page 10). The four westernmost NCDC regions experienced above–median seasonal temperatures, with the West experiencing the 17th warmest spring in 99 years of record (page 11). On a statewide basis, Arizona, Montana, and California ranked 8th, 16th, and 19th warmest, respectively. Unusually mild weather also prevailed across Alaska with seasonal departures ranging from +3°F along the south–central coast to +9°F in the interior. Temperatures soared to 82°F at Fairbanks, AK and to 51°F at Barrow, AK during May.

PRECIPITATION PERCENTILES

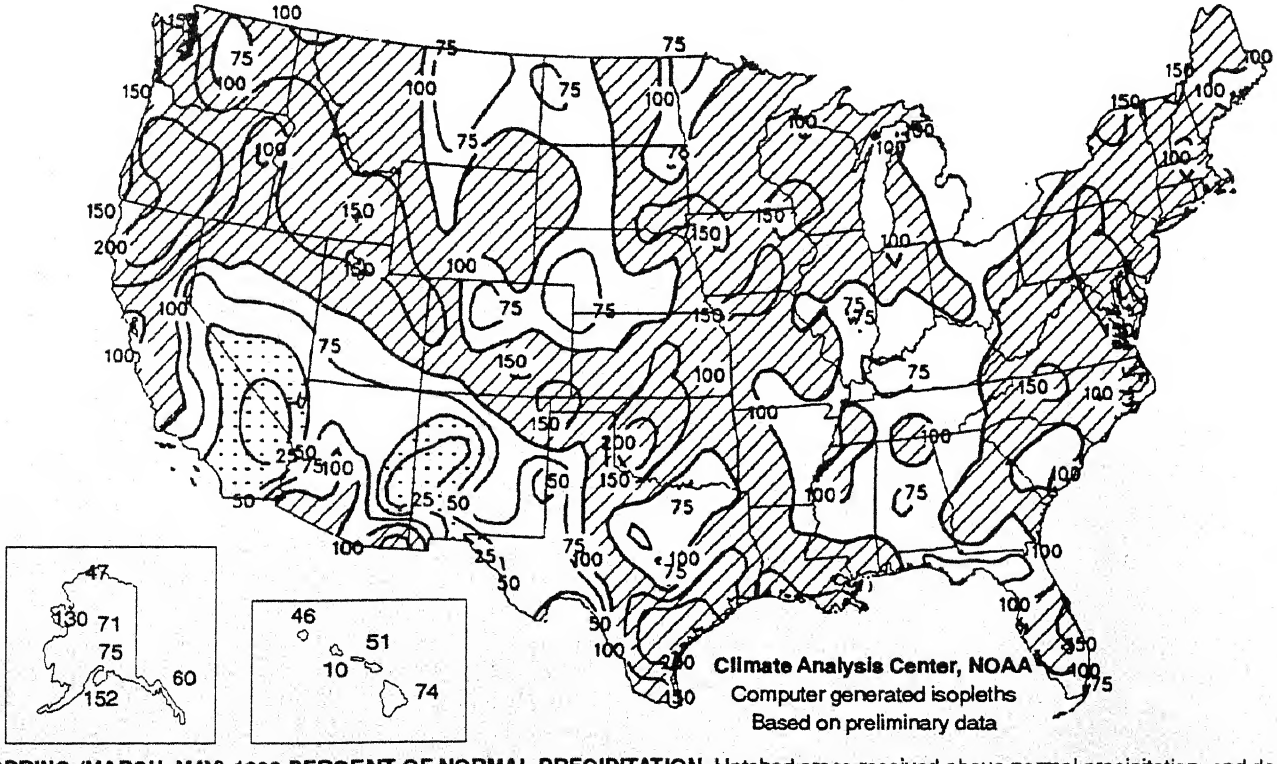
SPRING (MARCH – MAY) 1993



SPRING (MARCH–MAY) 1993 PRECIPITATION PERCENTILES. *A wet Spring (>70%ile) was observed across the Northwest, the western and central Gulf Coast, the Missouri and upper Mississippi Valleys, the western Great Lakes, and the mid-Atlantic, with Spring 1993 among the wettest 10% of the historical distribution in the Pacific Northwest and southeastern Texas. Climatologically significant dryness (<30%ile) was limited to eastern Montana.*

PERCENT OF NORMAL PRECIPITATION

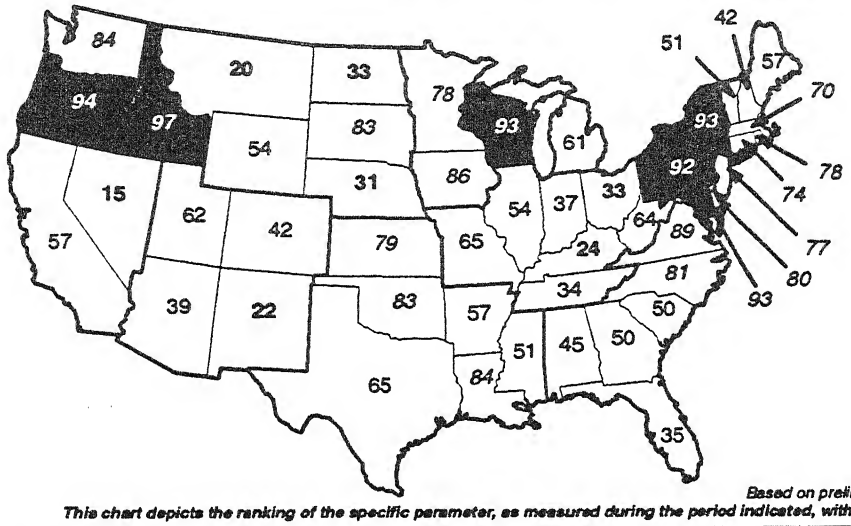
SPRING (MARCH – MAY) 1993



SPRING (MARCH–MAY) 1993 PERCENT OF NORMAL PRECIPITATION. Hatched areas received above normal precipitation, and dotted areas reported under half of normal. *Near to above normal precipitation was observed across most of the country, with parts of the Far West reporting over twice the normal amount. Only portions of the desert Southwest received under half of normal precipitation.*

HISTORICAL PRECIPITATION RANKINGS BY STATE

SPRING (MARCH–MAY) 1993



LEGEND

Among the ten driest

Among the ten wettest

1 – 33: DRY

34 – 66: NEAR NORMAL

67 – 99: WET

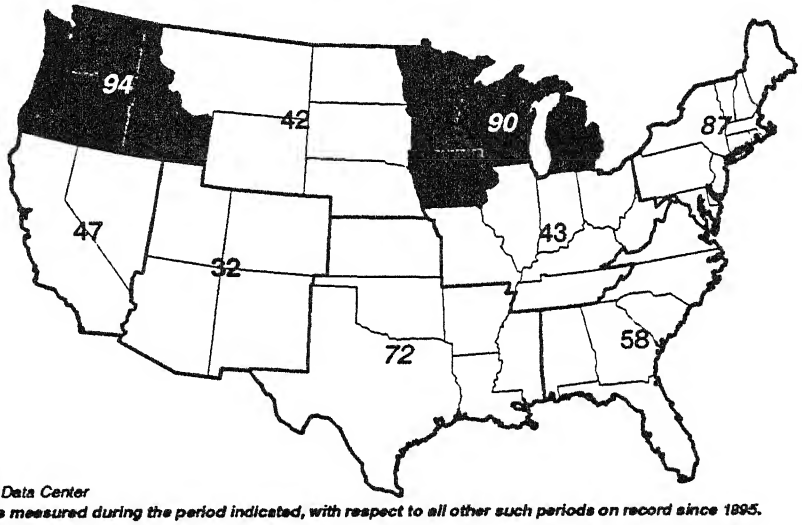
Climate Analysis Center, NOAA

Based on preliminary data generated by the National Climatic Data Center

This chart depicts the ranking of the specific parameter, as measured during the period indicated, with respect to all other such periods on record since 1895.

HISTORICAL PRECIPITATION RANKINGS BY REGION AND NATION

SPRING (MARCH–MAY) 1993



LEGEND

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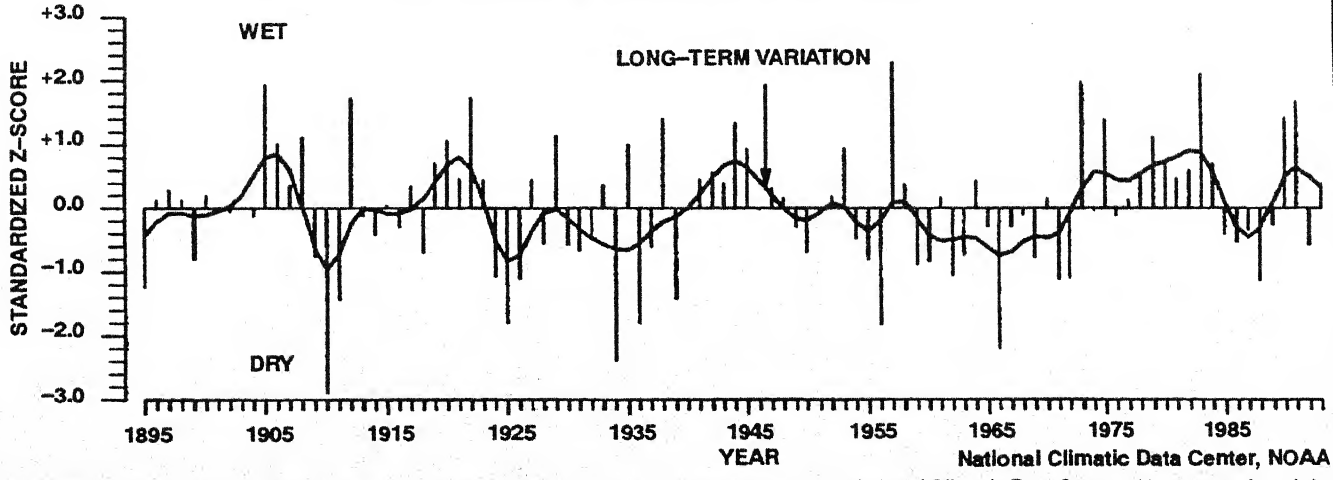
Climate Analysis Center, NOAA

Based on preliminary data generated by the National Climatic Data Center

This chart depicts the ranking of the specific parameter, as measured during the period indicated, with respect to all other such periods on record since 1895.

U. S. NATIONAL NORMALIZED PRECIPITATION INDEX

SPRING (MARCH–MAY) 1895–1993

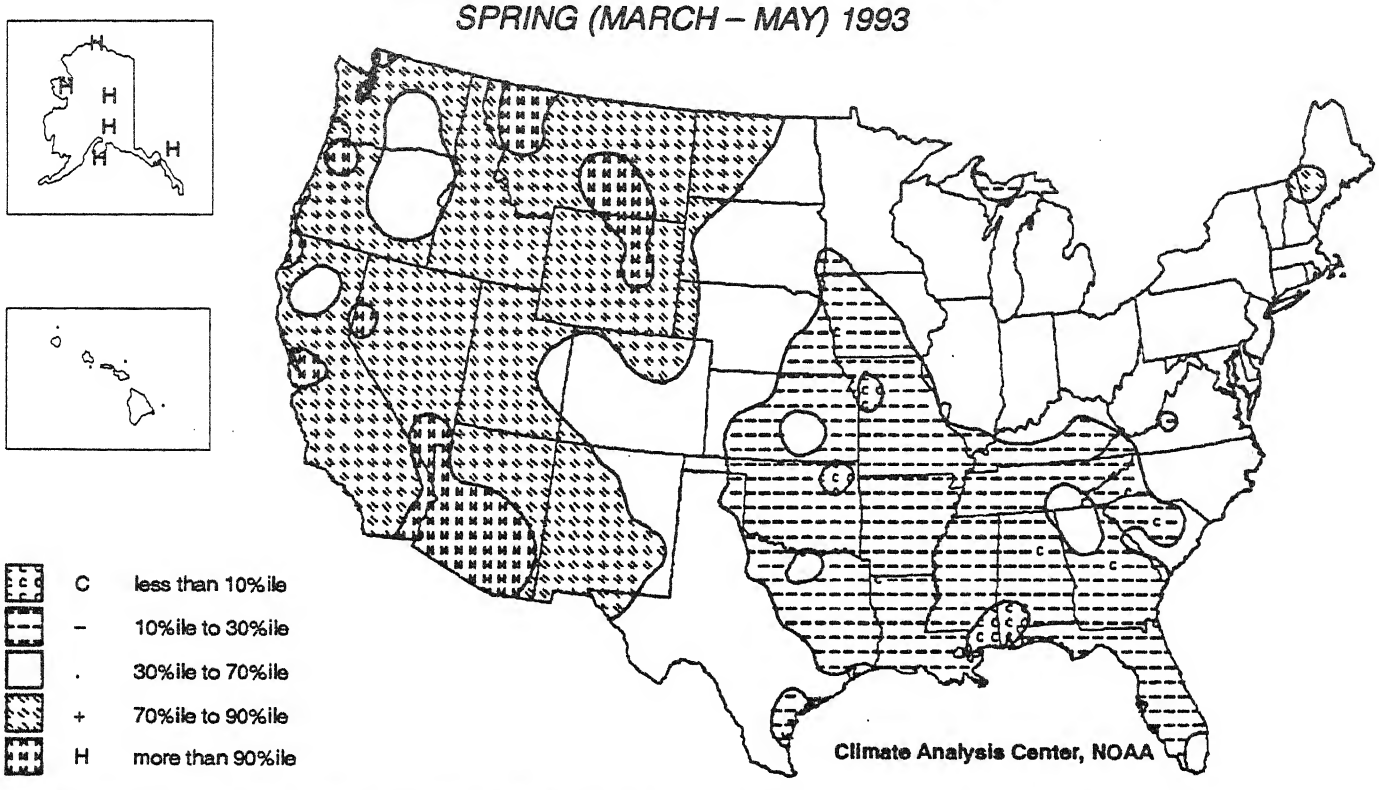


National Climatic Data Center, NOAA

NATIONAL MEAN SPRING (MARCH–MAY) PRECIPITATION INDEX, as computed by the National Climatic Data Center. *Above normal precipitation across most of the nation resulted in the 32nd wettest such season in 99 years. The index takes local normals into account so that regions with large precipitation amounts do not dominate the index value.*

TEMPERATURE PERCENTILES

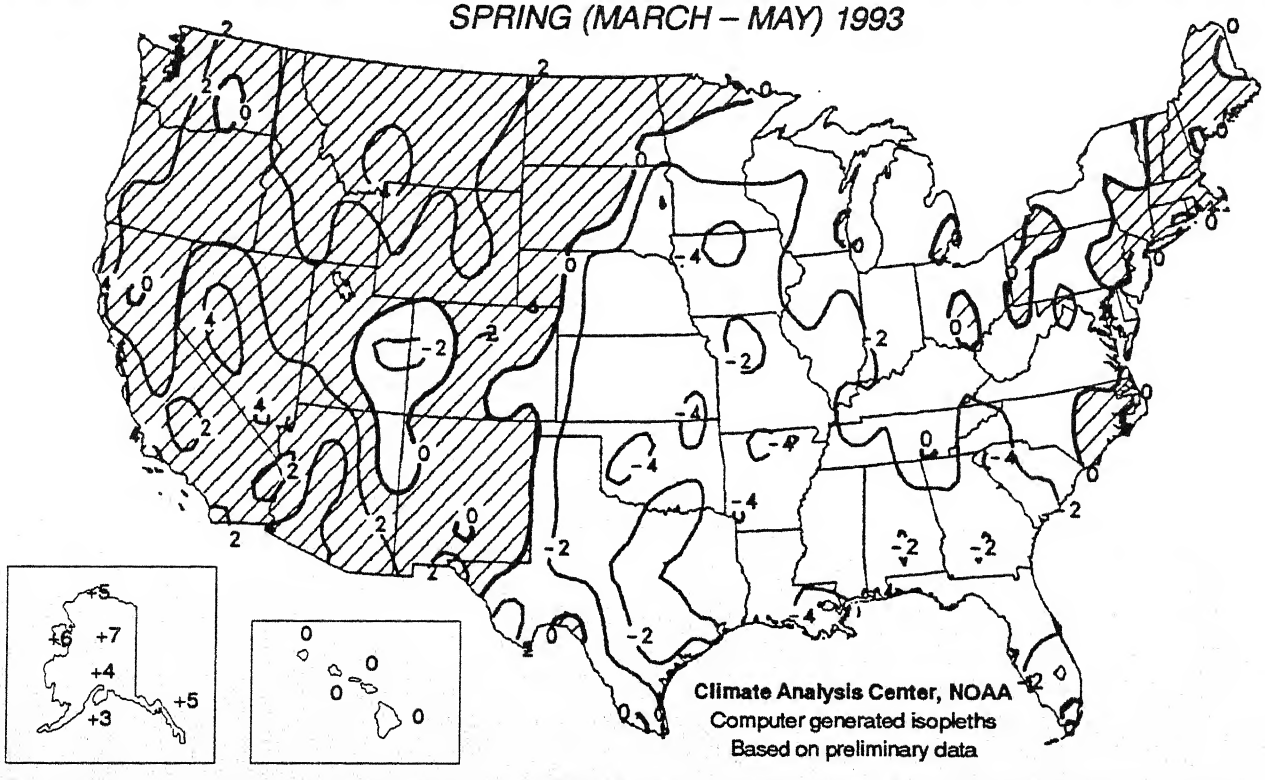
SPRING (MARCH – MAY) 1993



SPRING (MARCH–MAY) 1993 TEMPERATURE PERCENTILES. *Very warm conditions (>70%ile) dominated much of the West, with Spring 1993 among the warmest 10% of the historical distribution in the northern Rockies and the desert Southwest. In contrast, significantly colder than normal weather (<30%ile) prevailed across the central and southeastern states, with Spring 1993 among the coldest 10% of all such seasons in southern Mississippi and Alabama.*

DEPARTURE OF AVERAGE TEMPERATURE FROM NORMAL (°F)

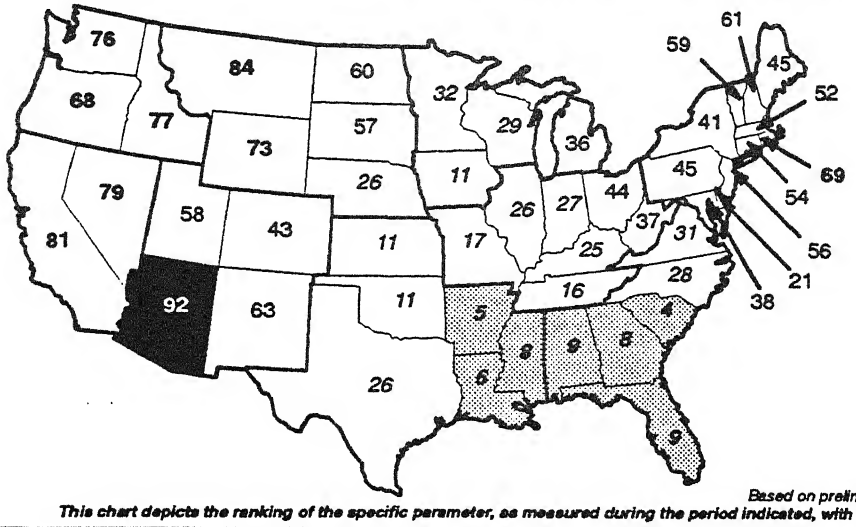
SPRING (MARCH – MAY) 1993



SPRING (MARCH–MAY) 1993 DEPARTURE OF AVERAGE TEMPERATURE FROM NORMAL (°F). Shaded areas experienced above normal temperatures. *Temperatures averaged at least 2°F above normal through most of the western half of the nation and in most of New England, with largest positive departures in Nevada and Montana. Seasonal mean temperatures at least 2°F below normal were observed across most of the Plains, Great Lakes, Southeast, and mid-Atlantic, with largest negative departures reported in the nation's midsection.*

HISTORICAL TEMPERATURE RANKINGS BY STATE

SPRING (MARCH–MAY) 1993



LEGEND

Among the ten coldest

Among the ten warmest

1 – 33: COLD

34 – 66: NEAR NORMAL

67 – 99: WARM

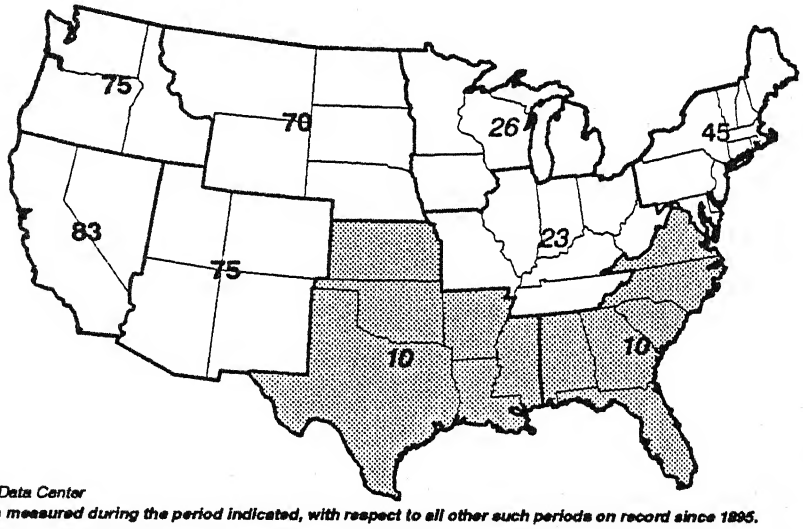
Climate Analysis Center, NOAA

Based on preliminary data generated by the National Climatic Data Center

This chart depicts the ranking of the specific parameter, as measured during the period indicated, with respect to all other such periods on record since 1895.

HISTORICAL TEMPERATURE RANKINGS BY REGION AND NATION

SPRING (MARCH–MAY) 1993



LEGEND

Among the ten coldest

Among the ten warmest

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34 – 66: NEAR NORMAL

67 – 99: WARM

Climate Analysis Center, NOAA

Based on preliminary data generated by the National Climatic Data Center

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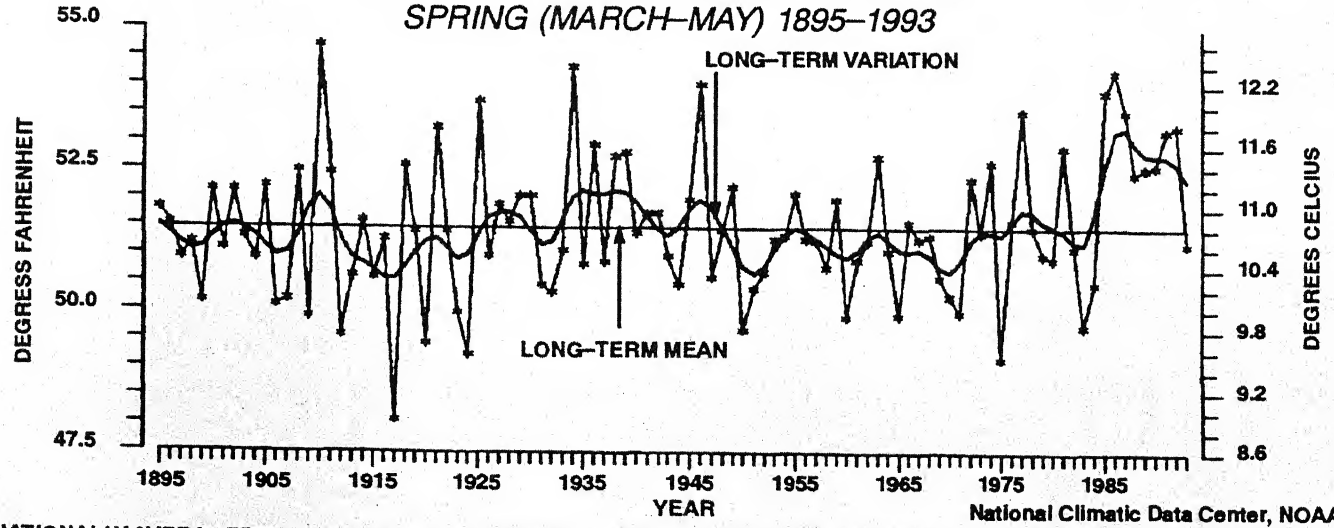
U. S. NATIONAL TEMPERATURE

SPRING (MARCH–MAY) 1895–1993

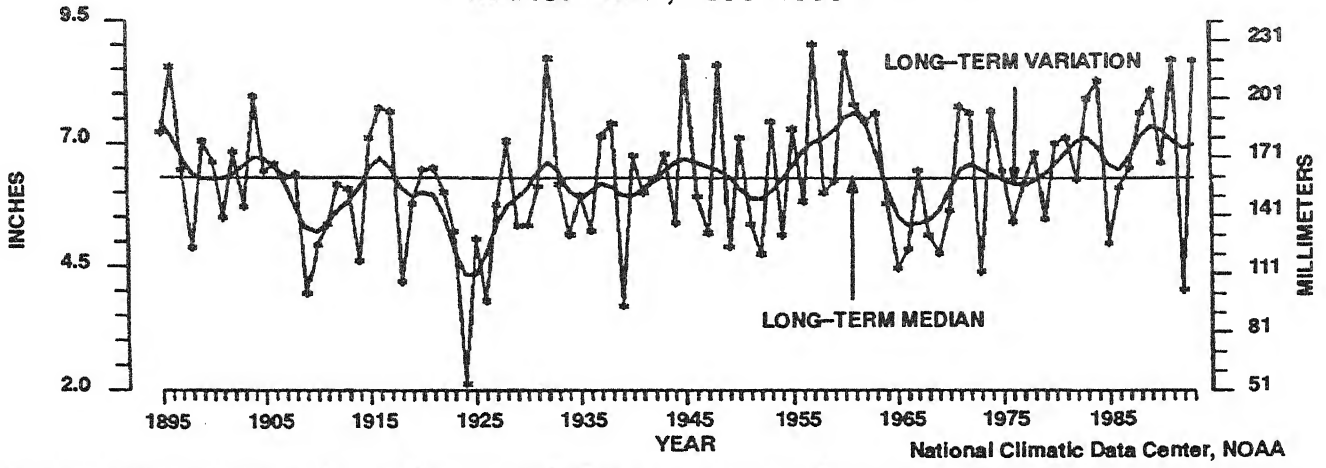


National Climatic Data Center, NOAA

NATIONALLY AVERAGED SPRING (MARCH–MAY) TEMPERATURES, as computed by the National Climatic Data Center. *Colder than normal weather dominated the country, especially early in the season, allowing Spring 1993 to become the 41st coldest such season since records began in 1895 and the first submedian Spring since 1984.*

NORTHWEST REGION PRECIPITATION

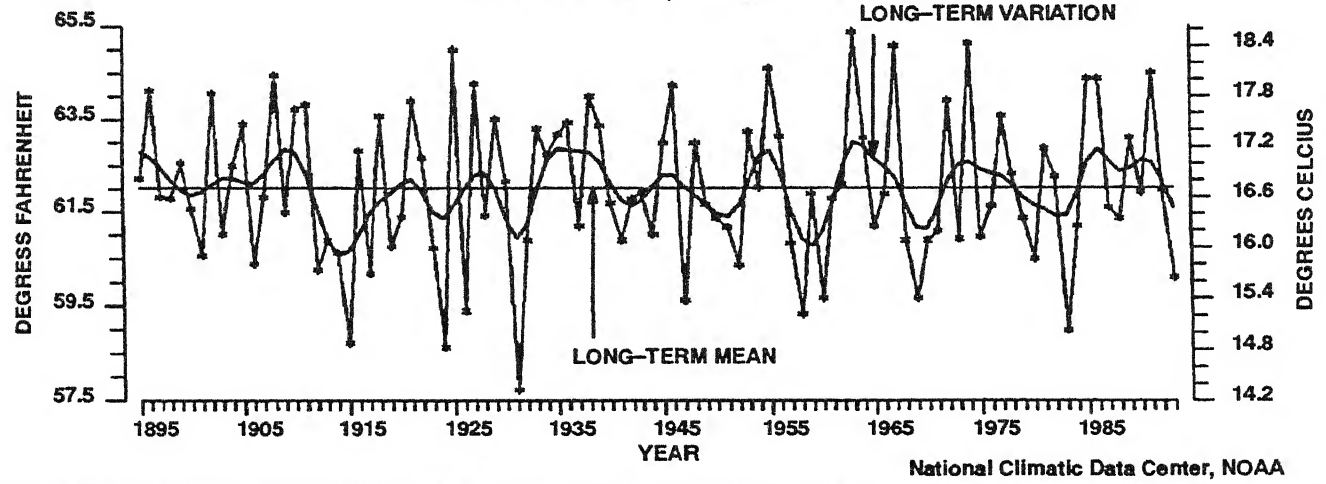
MARCH–MAY, 1895–1993



NORTHWEST REGION SPRING (MARCH–MAY) PRECIPITATION, as computed by the National Climatic Data Center. *Above normal precipitation dominated the region, allowing Spring 1993 to become the 6th wettest such season on record. This was the fourth spring to rank among the top ten in the last ten years.*

SOUTH REGION TEMPERATURE

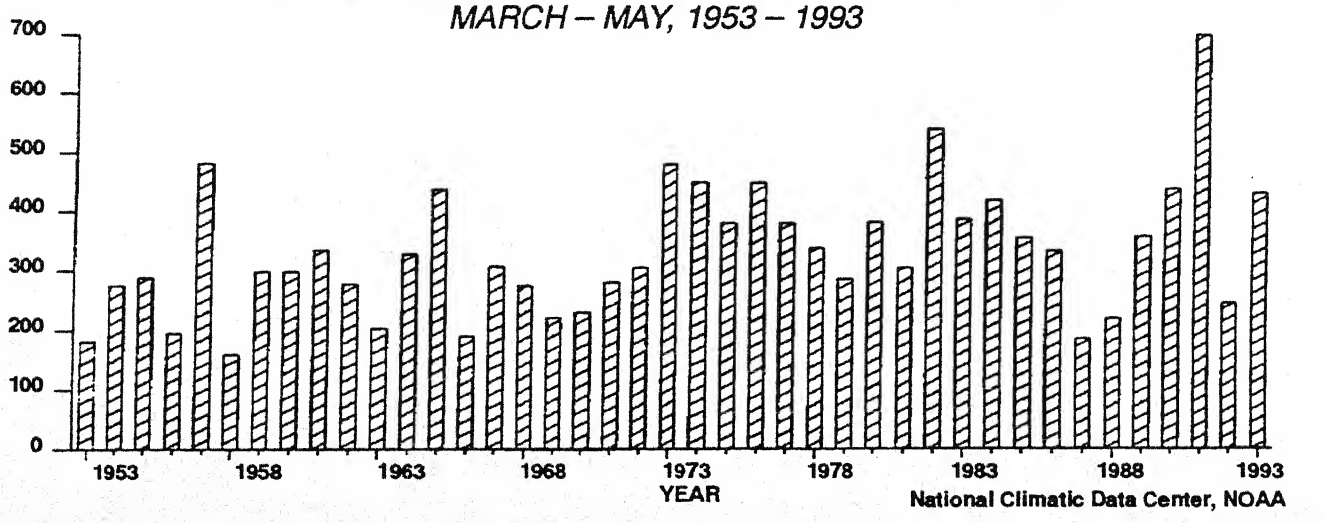
MARCH–MAY, 1895–1993



SOUTH REGION SPRING (MARCH–MAY) TEMPERATURES, as computed by the National Climatic Data Center. *In sharp contrast to last year, Spring 1993 contained subnormal temperatures, resulting in the coldest such season since 1983.*

TOTAL NUMBER OF OBSERVED TORNADOES

MARCH – MAY, 1953 – 1993



NUMBER OF TORNADOES OBSERVED IN THE UNITED STATES, as compiled by the National Climatic Data Center. *The 429 tornadoes across the United States during Spring 1993 was above the 40–year (1953–1992) average of 329. It should be noted, however, that the preliminary tornado count is generally 10% to 20% higher than the final count.*

EL NIÑO/SOUTHERN OSCILLATION (ENSO) DIAGNOSTIC ADVISORY 93/6

ISSUED BY

DIAGNOSTICS BRANCH
CLIMATE ANALYSIS CENTER, NMC

June 11, 1993

Atmospheric and oceanic anomaly fields during May indicated a continuation of mature warm episode (El Niño/SouthernOscillation – ENSO) conditions. Sea surface temperature (SST) anomalies increased substantially in the Niño3 and Niño 1+2 regions (Fig. 1), continuing a trend that began in January. SST anomalies were greater than +1°C in a large area of the eastern and central tropical Pacific during May, and exceeded +2°C in the region near 5°N from 110°W to 125°W (Fig. 2). Positive SST anomalies extended north and south along the west coast of the Americas to include coastal regions of southern California and northern Chile.

Since early 1990 low–level equatorial Pacific easterlies have been weaker than normal, equatorial SST anomalies have been positive near the date line, convection has been enhanced in the western equatorial Pacific, and the SOI has been predominantly negative. During the periods November 1991–May 1992 and January–May 1993 mature warm episode conditions developed in the tropical Pacific as SSTs in the eastern equatorial Pacific reached the peak in the seasonal cycle. During these periods tropical and extratropical precipitation anomaly patterns strongly resembled those generally found during warm episodes. Drier than normal conditions were observed in the Philippines, Indonesia, northern Australia, southeastern Africa, and northeastern Brazil. Wetter than normal conditions were found in the southern United States, central South America, along the west coast of tropical South America and in the central tropical Pacific.

It is not unprecedented to have two successive northern cold seasons characterized by mature warm episode conditions. However, the long period of negative SOI, which now spans more than three years (Fig. 3), has no analog in the historical record. Therefore, it is not surprising that statistically based forecasting techniques, such as the CCA, have had a difficult time in predicting the evolution of SST anomalies during the 1991–1993 period. The Cane and Zebiak model, which gave a good indication of the development of mature warm episode conditions in 1991–1992, failed to predict the subsequent development of mature warm episode conditions in early 1993. The reasons for this failure are not clear, but they may be related to the lack of a build–up in equatorial oceanic heat content that is an important feature in their model's ENSO cycle.

The NMC experimental coupled ocean/atmosphere model, using July 1992 initial conditions, predicted that SST anomalies would increase in early 1993. Subsequent runs with this model predicted that SST anomalies would increase through the northern spring 1993 and then begin to decrease thereafter. The most recent NMC coupled model forecasts (Fig. 4) indicate a more rapid decrease in SST anomalies than previous forecasts, with conditions along the equator becoming cooler than normal during September–November 1993. The skill for September–November is greatest along the equator near the date line and north and south of the equator in the central tropical Pacific. In contrast, the latest CCA forecast indicates that positive SST anomalies will continue in the central and eastern equatorial Pacific until early 1994, while the Cane and Zebiak model is forecasting near–normal conditions for the remainder of 1993.

Based on these forecasts, it seems likely that positive SST anomalies will continue in the tropical Pacific through August, and continue along the equator near the date line through November.

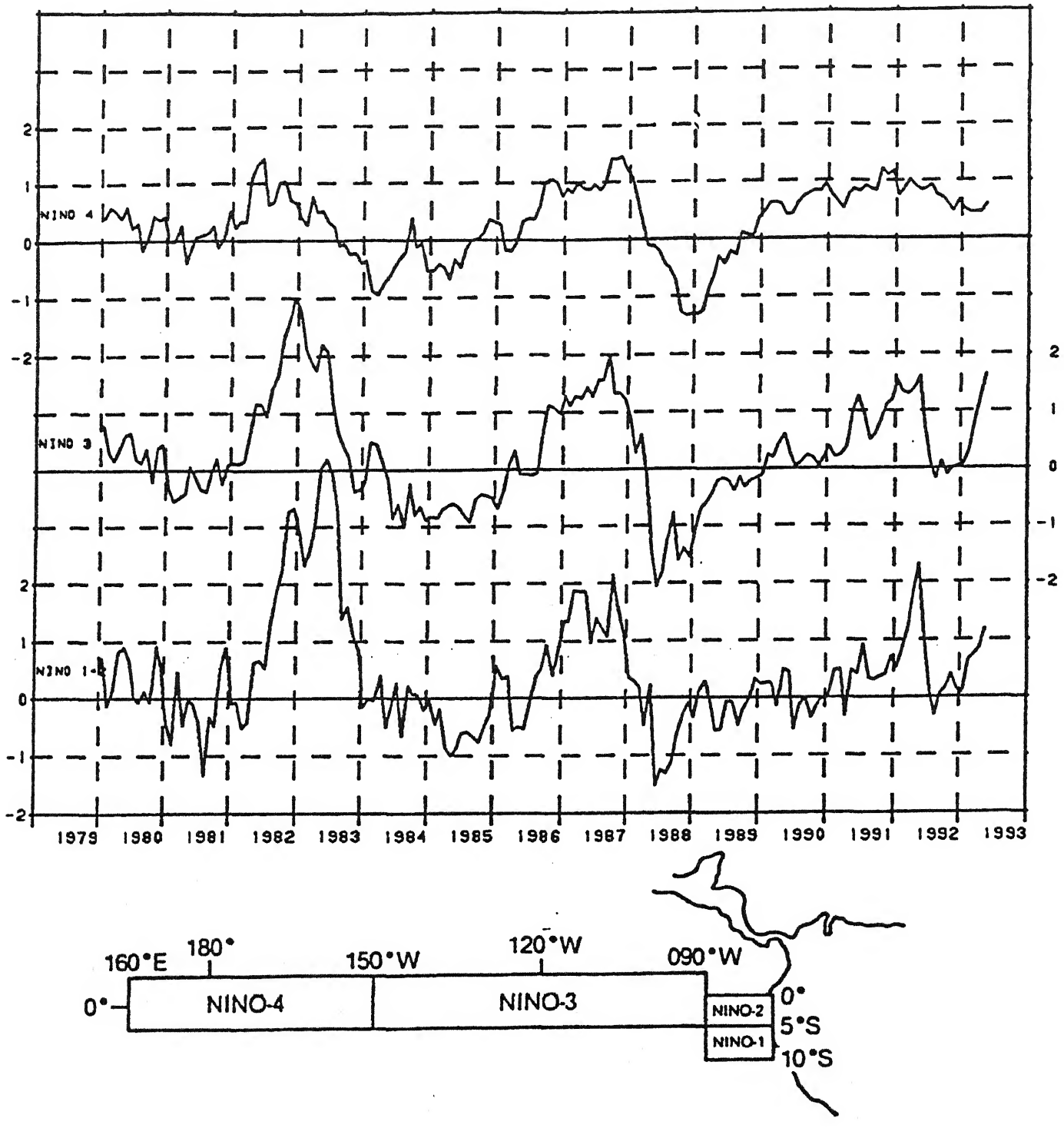


FIGURE 1 Equatorial Pacific sea surface temperature anomaly ...he areas indicated in the figure. *Niño 1+2 is the av-... and Niño 2 areas. Anomalies are computed with respect ...natology (Reynolds 1988,* J. Climate, *1, 75–86).*

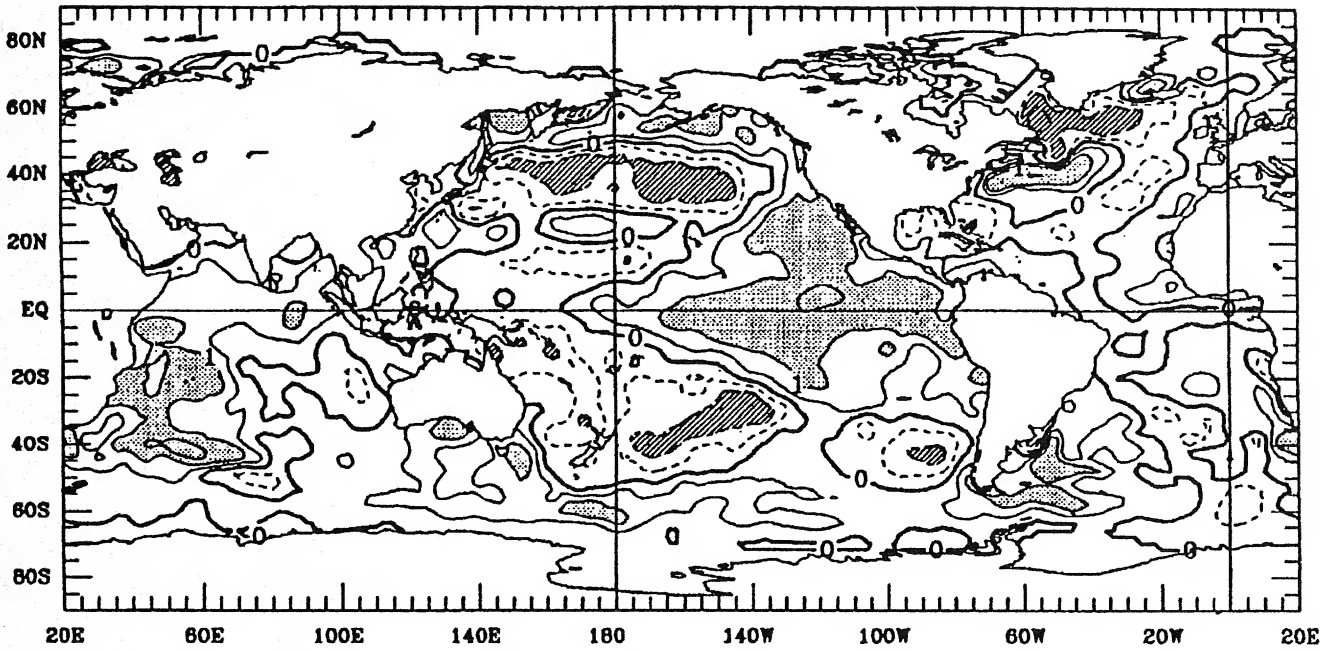


FIGURE 2. Blended sea surface temperature anomaly pattern for May 1993. *The contour interval is 1°C and negative contours are dashed. Additional contours of ±0.5°C are shown. Heavy contours are at 0°C. Light (dark) shading indicates anomalies greater (less) than 1°C (–1°C). Anomalies are computed as departures from the COADS/ICE climatology (Reynolds 1988,* J. Climate, *1, 75–86).*

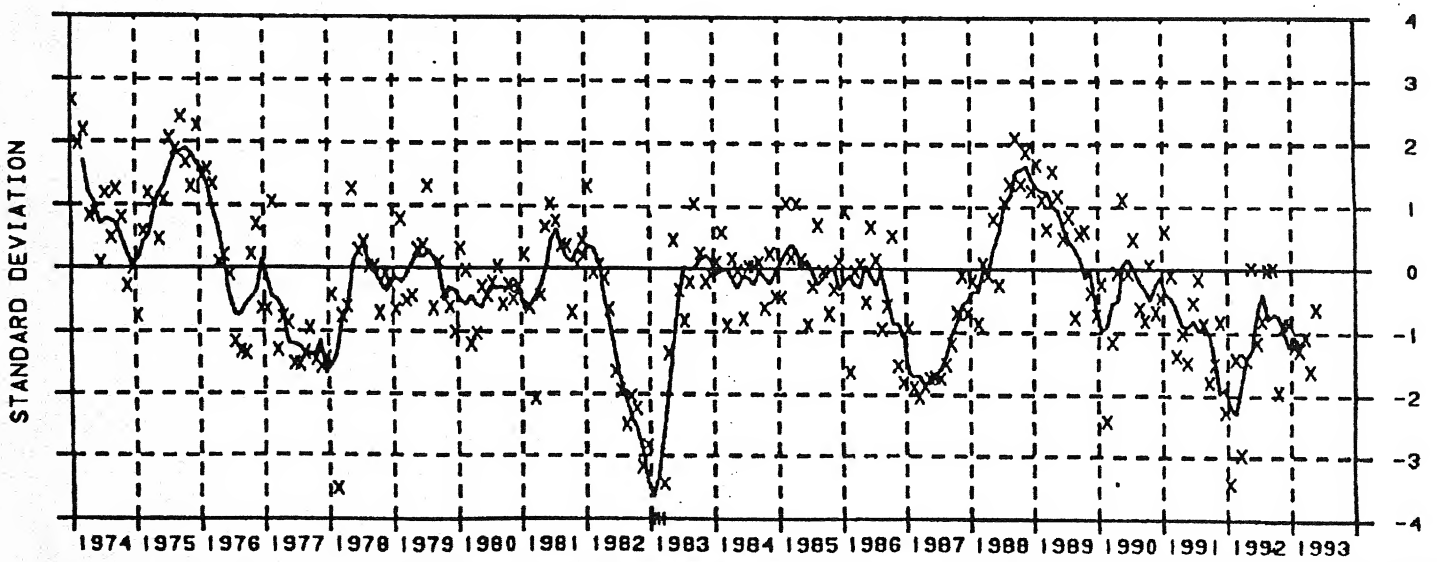


FIGURE 3. Five–month running mean of the difference between the standardized sea level pressure anomalies at Tahiti and Darwin (Tahiti minus Darwin). *Values are standardized by the mean annual standardized deviation. The "X"s indicate individual monthly means.*

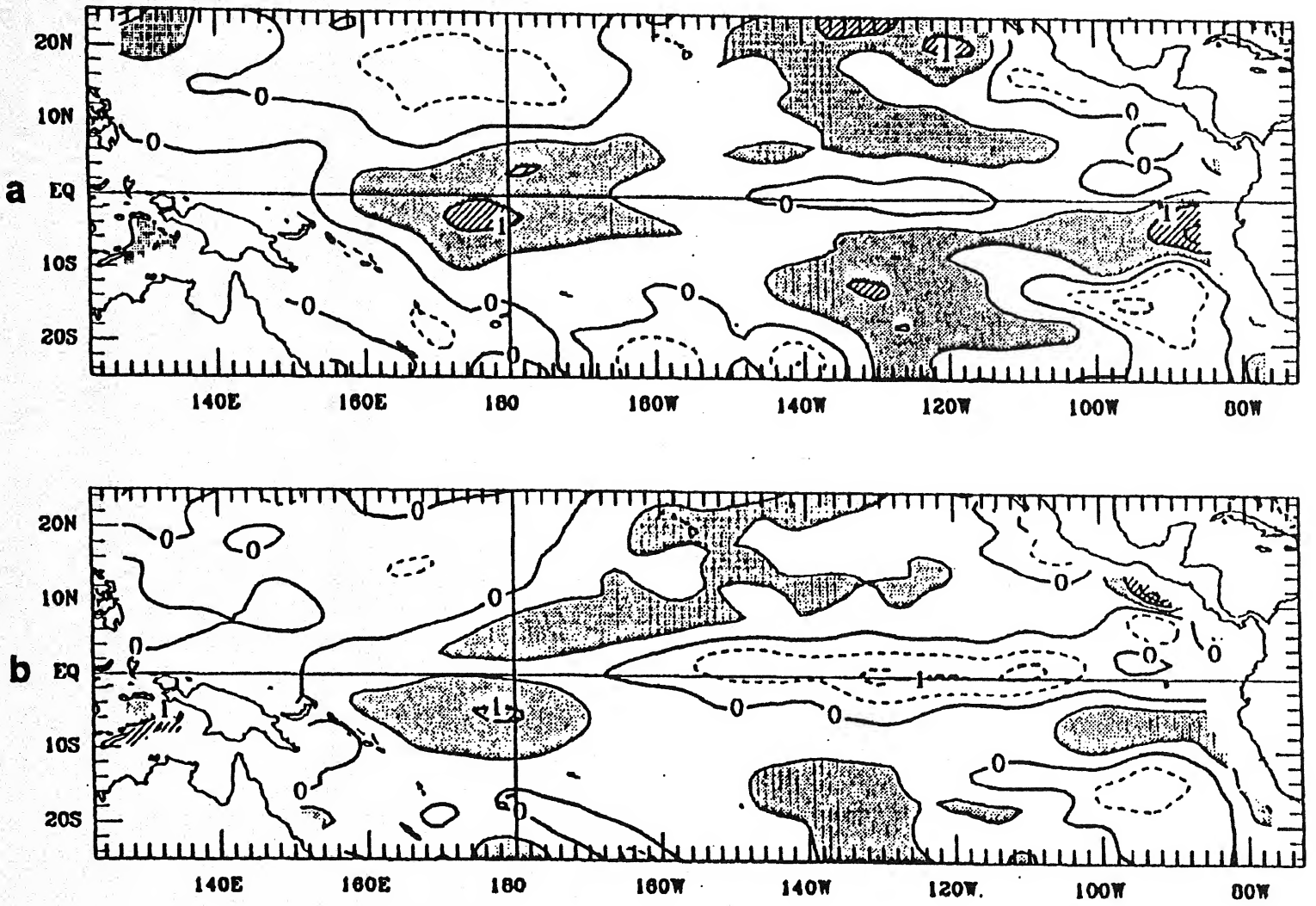


FIGURE 4. Predicted sea surface temperature anomalies for a) June–August 1993 and b) September–November 1993. *The forecasts are ensembles of six forecasts initiated using successive weekly analyzed ocean initial conditions from mid–April through mid–May 1993. The forecasts are made using a coupled ocean/atmosphere forecast system developed at the National Meteorological Center. Contour interval is 0.5°C. Negative anomalies are indicated by dashed contours, positive anomalies between 0.5°C and 1°C are shaded, and anomalies greater than 1°C are indicated by cross–hatching.*